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Pure MATHEMATICS 30

Module 4
Conics

ASSIGNMENT BOOKLET 4A

Learning
Technologies
Branch

Alberta
LEARNING

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Section 1 Assignment	45	

Teacher's Comments

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Parents	
General Public	
Other	

Pure Mathematics 30
Module 4: Conics
Assignment Booklet 4A
Section 1 Assignment
Learning Technologies Branch
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ASSIGNMENT BOOKLET 4A
PURE MATHEMATICS 30: MODULE 4
SECTION 1 ASSIGNMENT

Your mark for this module will be determined by how well you do your assignments in the Assignment Booklets.

This Assignment Booklet is worth 45 marks out of the total 100 marks for Module 4.

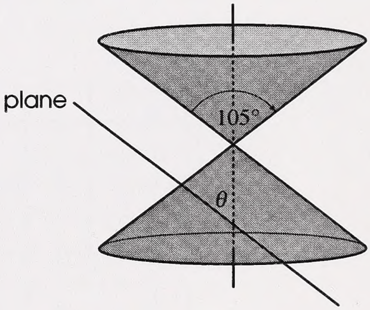
Work slowly and carefully. If you are having difficulties, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

㊺ Section 1 Assignment: Circles and Ellipses

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. The vertex angle of a double-napped cone is 105°. The angle θ is the angle measured from the axis to the cutting plane (as shown in the diagram). For what angle θ, or range of values for θ, does the cutting plane need to intersect the conical surface in order to generate each of the following conics?



① **a.** a circle

____

① **b.** a parabola

____

① **c.** an ellipse

____

① **d.** a hyperbola

____

③ **2.** A degenerate form of the hyperbola is a pair of interesting lines. Explain how you must position an intersecting plane to intersect the cone described in question 1 to obtain a degenerate hyperbola.

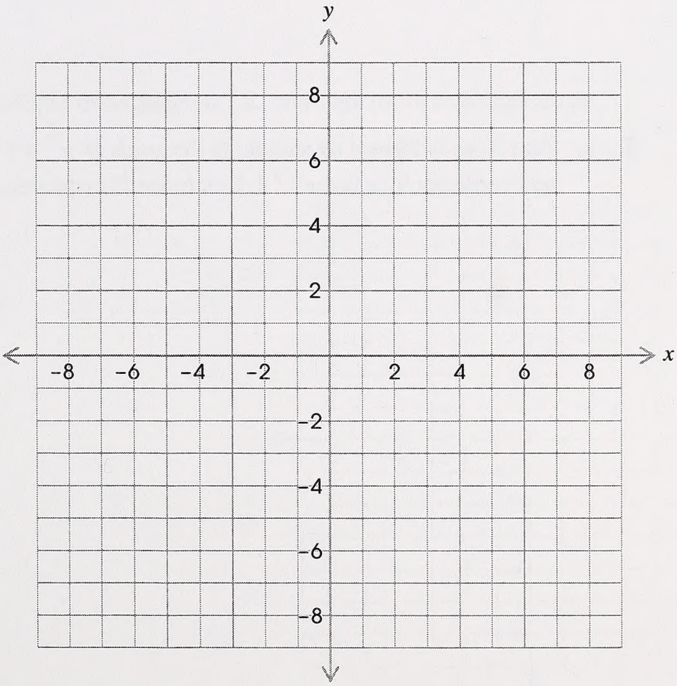
④ **3.** What degenerate form or forms of the parabola cannot be obtained from the intersection of a plane and a double-napped cone? Describe how to obtain this (or these) form(s). Use a diagram to support your answer.

④ **4.** A unit circle centred at the origin undergoes a series of transformations. The equation of the resulting graph is $(x-3)^2+(y+4)^2=25$. Describe the transformations the unit circle underwent.

5. Use $x^2 + y^2 - 6x + 8y + 9 = 0$ to do the following:

③ **a.** Write the equation in standard form.

④ **b.** Draw the graph of this equation, and state the domain and range.

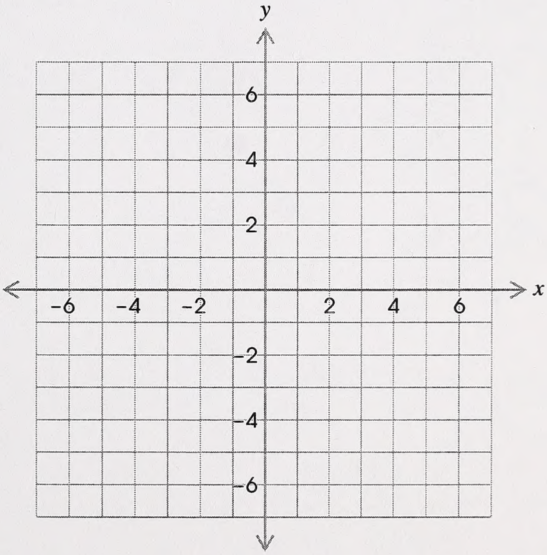


④ **6.** Determine the standard form of the equation of a circle with centre at $(4,-1)$ and passing through $(0,2)$.

③ **7.** **a.** An ellipse is formed by stretching the graph of $x^2+y^2=1$ horizontally by a factor of 3 and vertically by a factor of 4. Determine the equation of this ellipse in standard form.

④ **b.** The ellipse in question 7.a. is translated 4 units to the right and 2 units down. Determine the equation of this ellipse. Express your answer in both standard form and general form.

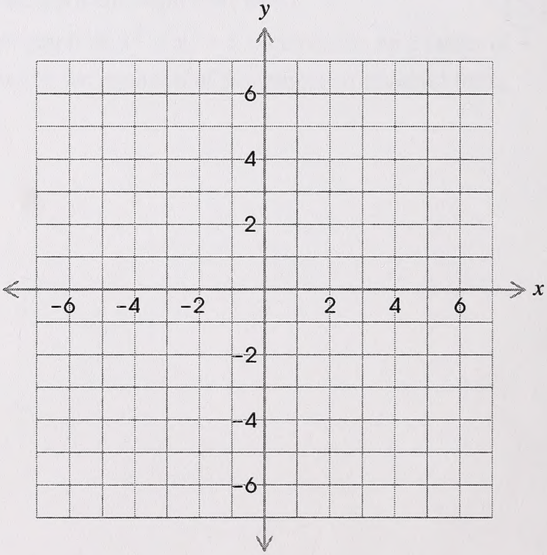
④ **c.** Draw the ellipse from question 7.b., and state the domain and range.



8. Use $9x^2 + 4y^2 + 18x - 16y - 11 = 0$ to do the following:

④ **a.** Write the equation in standard form.

④ **b.** Draw the curve, and state the domain and range.



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Module 4
Conics
ASSIGNMENT BOOKLET 4B

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Summary

	Total Possible Marks	Your Mark
Section 2 Assignment	40	
Final Module Assignment	15	
	55	

Teacher's Comments

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Parents	
General Public	
Other	

Pure Mathematics 30
Module 4: Conics
Assignment Booklet 4B
Section 2 Assignment and Final Module Assignment
Learning Technologies Branch
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ASSIGNMENT BOOKLET 4B
PURE MATHEMATICS 30: MODULE 4
SECTION 2 ASSIGNMENT AND FINAL MODULE ASSIGNMENT

Your mark for this module will be determined by how well you do your assignments in the Assignment Booklets.

This Assignment Booklet is worth 55 marks out of the total 100 marks for Module 4.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

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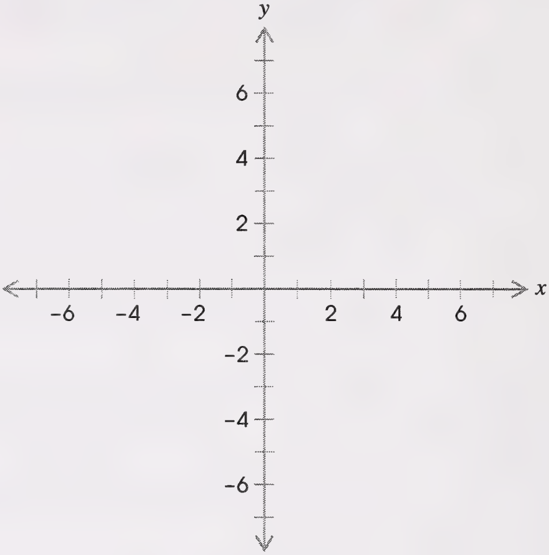
Section 2 Assignment: Hyperbolas and Parabolas

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

② **1.** **a.** Describe the transformations necessary to obtain the graph of $\frac{y^2}{16}-\frac{x^2}{4}=1$ from the graph of $y^2-x^2=1$.

② **b.** What are the slopes of the asymptotes of $\frac{y^2}{16}-\frac{x^2}{4}=1$?

④ **c.** Sketch the graph of $\frac{y^2}{16}-\frac{x^2}{4}=1$ and its asymptotes? Identify the vertices on your graph.



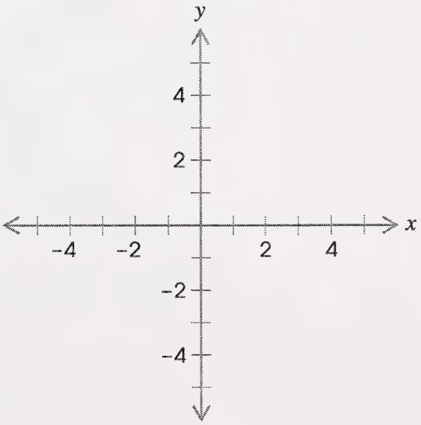
③ **2.** Determine the standard form of the equation of a hyperbola with vertices $(\pm 2, 0)$ and passing through $(4, 3)$.

3. Given $(y-2)^2 - \frac{x^2}{4} = 1$, do the following:

② **a.** Write the equation in general form.

② **b.** Locate the centre and vertices of this hyperbola.

④ **c.** Sketch the graph of the hyperbola and its asymptotes. Label the vertices on your graph.



4. Use $4x^2 - y^2 - 8x - 4y + 16 = 0$ to do the following:

④ **a.** Write the equation in standard form.

③ **b.** Locate the centre and the vertices of this curve.

② **c.** State the domain and range of this curve.

____

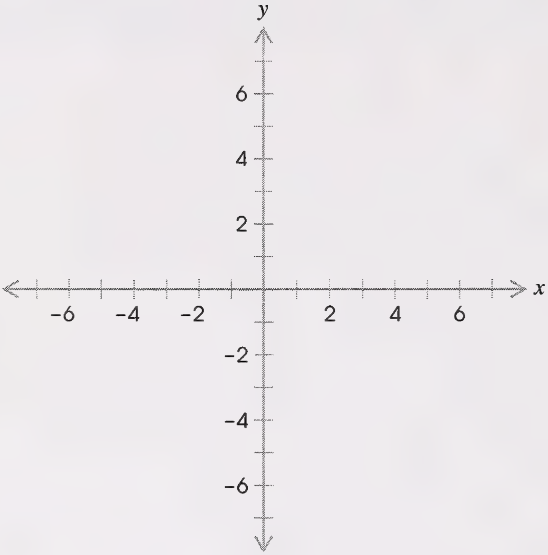
____

⑤ **5.** The graph of $y = x^2$ is reflected in the x-axis, then stretched vertically by a factor of 2, and then translated 3 units to the left and 1 unit down. What is the equation of this parabola? Write your answer in both standard form and general form.

6. Use $3y^2 - x - 12y + 14 = 0$ to do the following:

④ **a.** Write the equation in standard form.

③ **b.** Sketch the graph. Label the vertex.



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Final Module Assignment

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. The equation $2x^2 + Cy^2 + Dx + Ey + F = 0$ represents a conic. State the value(s) of C for which each of the following are possible.

① **a.** a circle

____

① **b.** an ellipse

____

① **c.** a parabola

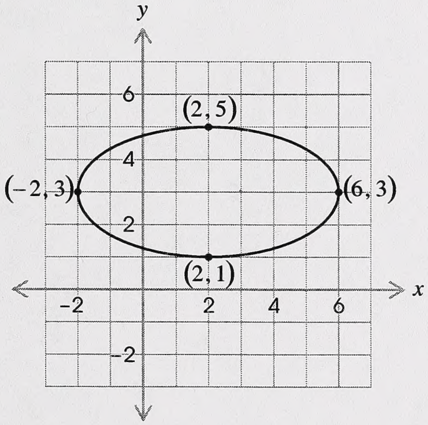
____

① **d.** a hyperbola

____

④ **2.** A cylindrical tent peg is driven into level ground. Later, it is removed by pulling it straight out. Describe the possible shapes of the top of the hole left by the tent peg at the surface of the ground. Explain how each of these shapes is formed. Use diagrams if necessary.

⑤ **3.** Determine the equation of the following ellipse in standard form and in general form.



② **4.** The circle $x^2 + y^2 - 2x - 3 = 0$ is stretched horizontally by a factor of 2 to obtain an ellipse. What is the equation of this ellipse in general form?

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